IT has been generally accepted that Moissan prepared diamonds synthetically by chilling an iron rich in carbon, the supposition being that in the interior of the mass of iron, solidified on the exterior, the pressure on solidification must be intense, and that under these conditions the carbon crystallized in the form of the diamond. This position is very strongly attacked by C. Combes in the *Moniteur Scientifique*. In his paper he argues that Goeppert and Friedel have found plant remains in diamonds, showing that the crystals must have been formed at a temperature below at least 772°. At the temperature of fused cast iron the diamond is converted into graphite. The diamonds supposed to have been formed by Moissan were doubly refracting, and hence not diamonds. Moissan's analyses of his crystals were unsatisfactory for diamonds. Finally Friedel has proved that such a mass of iron as was used by Moissan really contracts on cooling instead of expanding, and hence the supposed pressure was not present. Thus it appears to Combes impossible that Moissan has prepared diamonds synthetically. It is, however, possible that Hannay was more successful in this respect. J. L. H.

RECENT ZOOPALEONTOLOGY.

THE SAUROPODA.

Two memoirs have recently appeared on this group which greatly extend our knowledge, from the Carnegie and the Field Columbian Museums.

'Osteology of Haplocanthosaurus.'* This memoir by Mr. J. B. Hatcher is devoted to a new sauropod which is decidedly more primitive than any of the American Sauropoda hitherto discovered. In an exhaustive memoir illustrated with six plates the author describes it in detail. The principal new points are the following: The spines of all the cervical and dorsal vertebræ are single or simple, as in the carnivorous dinosaurs, instead of double, as in *Diplodocus, Morosaurus* and *Brontosaurus*. There are apparently fourteen dorsal vertebræ instead of ten as in the above-named forms, and from thirteen to fifteen cervicals; five sacrals and about forty caudals. The locality is the classic one of Cañon City, from which Marsh secured his type of *Diplodocus* about 150 feet above the summit of the red Triassic sandstones; the author believes it to be a lower horizon, of greater age than the Como Bluffs. As regards proportions, the thoracic region is believed to be proportionately longer than in the other dinosaurs. The limbs are elevated, and *Haplocanthosaurus* appears to have been an essentially quadrupedal type.

As regards general questions, the author considers the Dinosauria as a subclass. He adheres to the use of the term Sauropoda in preference to Opisthocœlia Owen or Cetiosauria Seeley. In this connection it may be pointed out that while Owen defined the Opisthocœlia as the suborder Crocodilia in 1859, he recognized them as Dinosauria in 1875. *Haplocanthosaurus* is placed in the family Morosauridæ, which is considered the most primitive family of Sauropoda. An especially interesting point is its resemblance to a type recently described from South America.

A very valuable feature of the memoir is the discussion of the age of the *Atlantosaurus* beds and of the geological section at Cañon City. The author shows that Cope's *Camarasaurus* skeleton was probably found 350 feet higher than *Haplocanthosaurus*. The conclusion is that the beds are chiefly of Upper Jurassic age, but in their uppermost members they may represent a portion at least of the Cretaceous.

'Structure and Relationships of Opisthocœlian Dinosaurs.'* The skeleton on which

* 'Osteology of Haplocanthosaurus with Description of a New Species, and Remarks on the Probable Habits of the Sauropoda and the Age and Origin of the Atlantosaurus Beds,' by J. B. Hatcher, *Memoirs Carnegie Museum*, Volume II., No. 1, November, 1903. There are a few points requiring revision: The sacral ribs are described as 'parapophyses,' which a reference to the Permian ancestors of the dinosaurs will probably show to be incorrect. The theory that the Sauropoda were aquatic reptiles is through a misunderstanding attributed to Osborn.

* 'Structure and Relationships of Opisthocœlian Dinosaurs, Part I., Apatosaurus Marsh,' by Elmer S. Riggs, A.M., Publ. Field Columbian Museum 82, Geol. Ser., Vol. II., No. 4, August, 1903.

Dr. E. S. Riggs bases this interesting memoir was found in the Grand River Valley, near Fruita, Colorado, in 1900. As illustrating the enormous labor connected with the preparation of such a specimen it may be mentioned that three skilled men were employed for more than eighteen months in mounting it.

The author adopts the term Opisthocœlia as having priority over either Cetiosauria or Sauropoda. Of still greater novelty is his identification of *Brontosaurus* with *Apatasaurus,* the type of which is that of a young animal differing from the subsequently described *Brontosaurus* in juvenile characters only.

The material includes the last cervical vertebra and the entire dorsal, sacral and caudal series as far back as the twenty-fourth caudal. We thus for the first time come into possession of the exact characters of the dorsals and of the full series of anterior caudals. These are very accurately figured and described by the author. The formula, like that of *Diplodocus* and *Morosaurus,* is, dorsals, 10, sacrals, 5, caudals, 24+. The writer shows that Marsh placed too many vertebræ in the back in his restoration, while Osborn also erred in placing too many in the anterior portion of the tail.

The morphology of the sacral region of the Opisthocœlia in general is very accurately described, the only error being in the diagrammatic representation of the rib of the caudo-sacral, which should be like that of the primary sacrals and unlike that of the dorso-sacral as shown by reference to the Permian ancestors of the Dinosaurs. The author's theory (p. 185) of the early formation of the sacral vertebræ is also probably incorrect, because the primitive Diaptosauria (*Palæohatteria*) show very early a marked separation of the anterior sacral ribs from the posterior dorsal ribs.

The restoration of *Brontosaurus* is by far the most correct we have ever had. It illustrates especially the extreme shortness of the back and the marked elevation of the sacral spines.

H. F. O.

THE MILWAUKEE MUSEUM.

The Report of the Board of Trustees of the Public Museum of the city of Milwaukee may well be read in conjunction with Mr. Bather's article in *Popular Science Monthly* on 'The Functions of Museums,' as in it the custodian explains what has been done and what, with proper facilities, may be done for the public and for students. Mr. Ward's desire to give a proper representation of the animals of Wisconsin and of North America, before 'dabbling in foreign specimens' is a step in the right direction; the Milwaukee Museum is one of our larger municipal museums and yet much smaller institutions waste much time and effort in the endeavor to duplicate the work of the large museums, the result being a small ill-balanced display of heterogeneous objects with nothing properly represented.

Few realize how extensive is the fauna and flora of any given locality and how interesting and instructive is a properly arranged and well-labeled local collection. The importance and efficiency of a museum does not depend merely upon its size, but upon the manner in which its collections are cared for and utilized. Mr. Ward shows great courage in discussing the question of gifts to museums, and treats the matter much as did Mr. Bather. In the earlier stages of growth of a museum collections are often accepted with the proviso that they are to be kept by themselves, and later on these gifts prove so many millstones around the neck of the institution, seriously hampering the progress of the museum. The way out of the difficulty is pointed out by both Mr. Ward and Mr. Bather; either let the gift be confined to desirable specimens or exhibits that may form part of an orderly whole, or let them be declined. Those who really have the good of a museum, or for that matter, other institutions at heart, will appreciate and accept the proviso and contribute to its growth and progress.

The Milwaukee Museum has added to its exhibition series cases containing the birds of the region about Milwaukee and a case comprising the birds found at various periods of the year, the contents of this being changed according to the season; also a number of